

11. A method of administering nucleic acid to an animal, comprising

providing the microparticle of claim 8; and  
introducing the microparticle into the animal.

12. A microparticle less than about 20 microns in diameter, comprising:

a polymeric matrix; and

a nucleic acid molecule comprising an expression control sequence operatively linked to a coding sequence, wherein the coding sequence encodes a protein which, when expressed in a macrophage, downregulates an immune response in an animal.

13. A process for preparing microparticles, comprising:

(1) providing a first solution comprising a polymer dissolved in an organic solvent;

(2) providing a second solution comprising a nucleic acid dissolved or suspended in a polar or hydrophilic solvent;

(3) mixing the first and second solutions to form a first emulsion; and

(4) mixing the first emulsion with a third solution comprising an organic compound, to form a second emulsion comprising microparticles of polymeric matrix and nucleic acid; wherein both mixing steps are carried out in a manner that minimizes shearing of the nucleic acid while producing microparticles having a number average smaller than 100 microns in diameter.

14. A method of administering nucleic acid to an animal, comprising

providing the microparticle of claim 2; and  
introducing the microparticle into the animal.

15. A preparation of microparticles, each of which comprises:

a polymeric matrix;

a proteinaceous antigenic determinant; and

DNA which encodes an antigenic polypeptide.

16. The preparation of claim 15, wherein said antigenic determinant elicits an antibody response in a mammal.

17. The preparation of claim 15, wherein said antigenic polypeptide elicits a T cell response.

18. The preparation of claim 17, wherein said T cell response is a cytotoxic T cell (CTL) response.

19. The preparation of claim 15, wherein said DNA is plasmid DNA.

20. A method of administering nucleic acid to an animal, comprising

providing the preparation of claim 15; and

introducing the preparation into the animal.

21. A microparticle less than about 20 microns in diameter, comprising:

a polymeric matrix; and

a nucleic acid molecule comprising an expression control sequence operatively linked to a coding sequence encoding an expression product comprising a traffick-

ing sequence linked to a polypeptide, said polypeptide being at least 7 amino acids in length and having the sequence of (a) a fragment of a naturally-occurring mammalian protein or (b) a fragment of a naturally-occurring protein from an infectious agent which infects a mammal, wherein the expression product includes (i) part but not all of the naturally-occurring mammalian protein or (ii) part but not all of the naturally-occurring protein from an infectious agent.

22. The microparticle of claim 21, wherein the polypeptide is immunogenic.

23. The microparticle of claim 21, wherein the polypeptide (1) is recognized by a T cell; and (2) alters the cytokine profile of the T cell.

24. A microparticle less than about 20 microns in diameter, comprising:

a polymeric matrix; and

a nucleic acid molecule comprising an expression control sequence operatively linked to a coding sequence encoding an expression product having a length and sequence which permit it to bind to an MHC class I or II molecule.

25. The microparticle of claim 24, wherein the expression product is immunogenic.

26. The microparticle of claim 24, wherein the expression product (1) is recognized by a T cell; and (2) alters the cytokine profile of the T cell.

27. A microparticle less than about 20 microns in diameter, comprising:

a polymeric matrix; and

a nucleic acid molecule comprising an expression control sequence operatively linked to a coding sequence encoding an expression product consisting of a trafficking sequence linked to a peptide having a length and sequence which permit it to bind to an MHC class I or II molecule.

28. The microparticle of claim 27, wherein the peptide is immunogenic.

29. The microparticle of claim 27, wherein the peptide (1) is recognized by a T cell, and (2) alters the cytokine profile of the T cell.

30. A method of administering nucleic acid to an animal, comprising

providing the microparticle of claim 21; and

introducing the microparticle into the animal.

31. A method of administering nucleic acid to an animal, comprising

providing the microparticle of claim 24; and

introducing the microparticle into the animal.

32. A method of administering nucleic acid to an animal, comprising

providing the microparticle of claim 27; and

introducing the microparticle into the animal.

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